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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/909,574	07/20/2001	Frank A. Skraly	MBX 039	2982
23579	7590	11/02/2004	EXAMINER PAK, YONG D	
PATREA L. PABST PABST PATENT GROUP LLP 400 COLONY SQUARE SUITE 1200 ATLANTA, GA 30361			ART UNIT 1652	PAPER NUMBER

DATE MAILED: 11/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/909,574

Applicant(s)

SKRALY ET AL.

Examiner

Yong D Pak

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

The amendment filed on August 19, 2004, canceling claims 22 and 23 and amending claims 1 and 8-10, has been entered.

Claims 1-4 and 6-10 are pending.

Response to Arguments

Applicant's amendment and arguments filed on August 19, 2004, have been fully considered and are deemed to be persuasive to overcome the rejections previously applied. Rejections and/or objections not reiterated from previous office actions are hereby withdrawn. Specifically, Examiner has withdrawn the previous rejection of claims 1-4 and 6-10 under 35 U.S.C. 112, 2nd paragraph.

Claim Objections

Claim 8 is objected to because of the following informalities: Claim 8 recites an abbreviated "*dhaT*" and "*aldH*" without providing its expansion. The Examiner requests the applicants to expand the abbreviation at least in the first recitation. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the

art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-4 and 6-10 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1-4 and 6-10 are drawn to a method for producing polyhydroxyalkanoates from 4-hydroxybutyrate, 2-hydroxybutyrate, 4-hydroxyvalerate, 5-hydroxyvalerate, 6-hydroxyhexanoate, 2-hydroxyethanoate, 2-hydroxyisopionate and 3-hydroxyhexanoate in any organism, wherein the hydroxyalkanoates are produced from any diols using any diol oxidoreductase and any aldehyde dehydrogenase. Although claims 2-4 and 6-7 limit the claim 1 to specific diols, the hydroxyalkanoates are produced using any diol oxidoreductase and any aldehyde dehydrogenase. Therefore, these claims are drawn to a method of using a genus of diol oxidoreductase having any structure, a genus of aldehyde dehydrogenase having any structures, a genus of organisms and/or a genus of any diols. The genus of diol oxidoreductase and the genus of aldehyde dehydrogenase comprise of numerous enzymes that may or may not convert 1,6-hexanediol, 1,5-pentanediol, 1,4-butanediol, 1,3-propanediol, 1,2-ethanediol and 1,2-propanediol to its corresponding hydroxyalkanoate. And, a genus of diol oxidoreductase and genus of aldehyde dehydrogenase comprise of numerous enzymes that may or may not convert any diols to 4-hydroxybutyrate, 2-hydroxybutyrate, 4-hydroxyvalerate, 5-hydroxyvalerate, 6-hydroxyhexanoate, 2-hydroxyethanoate, 2-

hydroxypropionate and 3-hydroxyhexanoate. And, any organism, i.e. mammals, may or may not be able to form polyhydroxyalkanoates even if all enzymes recited in the claims are present.

Further, the genus comprising aldehyde dehydrogenase comprise of species that are structurally unrelated and utilize substrates unrelated to the diols listed above (see ExPASy database: aldehyde dehydrogenase). Similarly, the genus comprising diol oxidoreductase comprises of species that are structurally unrelated and utilize substrates unrelated to the diols listed above (See ExPASy database: diol oxidoreductase). The specification only describes a method of producing polyhydroxyalkanoates from hydroxyalkanoates by converting 1,6-hexanediol, 1,5-pentaediol, 1,4-butanediol, 1,3-propanediol, 1,2-ethanediol or 1,2-propanediol in bacteria with an aldehyde dehydrogenase (aldH) from *E. coli* and a 1,3-propanediol oxidoreductase (dhaT) from *K. pneumoniae*. Therefore, the specification fails to describe a representative species of the genus of diol oxidoreductase, genus of aldehyde dehydrogenase, genus of diols and genus of organism that are able, in combination, to convert diols to said hydroxyalkanoates.

Given this lack of description of the representative species encompassed by the genus of the claims, the specification fails to sufficiently describe the claimed invention in such full, clear, concise, and exact terms that a skilled artisan would recognize that applicants were in possession of the inventions of claims 1-4 and 6-10.

Claim 8 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 8 is drawn to a method for producing polyhydroxyalkanoates from 4-hydroxybutyrate, 2-hydroxybutyrate, 4-hydroxyvalerate, 5-hydroxyvalerate, 6-hydroxyhexanoate, 2-hydroxyethanoate, 2-hydroxyisopropionate and 3-hydroxyhexanoate in any organism, wherein the hydroxyalkanoates are produced from any diols using aldH as the aldehyde dehydrogenase and dhaT as the oxidoreductase. Therefore, these claims are drawn to a method of using a genus of dhaT having any structure and a genus of aldH having any structure. The genus of dhaT and genus of aldH comprise of numerous enzymes that may or may not convert any diols to 4-hydroxybutyrate, 2-hydroxybutyrate, 4-hydroxyvalerate, 5-hydroxyvalerate, 6-hydroxyhexanoate, 2-hydroxyethanoate, 2-hydroxyisopropionate and 3-hydroxyhexanoate. The specification only describes a method of producing polyhydroxyalkanoates from hydroxyalkanoates by converting 1,6-hexanediol, 1,5-pentanediol, 1,4-butanediol, 1,3-propanediol, 1,2-ethanediol or 1,2-propanediol in bacteria with an aldehyde dehydrogenase (aldH) from *E. coli* and a 1,3-propanediol oxidoreductase (dhaT) from *K. pneumoniae*. Therefore, the specification fails to describe a representative species of the genus of dhaT and a genus of aldH, genus of that are able, in combination, to convert diols to said hydroxyalkanoates.

Given this lack of description of the representative species encompassed by the genus of the claims, the specification fails to sufficiently describe the claimed invention in such full, clear, concise, and exact terms that a skilled artisan would recognize that applicants were in possession of the inventions of claim 8.

Applicant is referred to the revised guidelines concerning compliance with the written description requirement of U.S.C. 112, first paragraph, published in the Official Gazette and also available at www.uspto.gov.

Claims 1-4 and 6-10 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a method of producing polyhydroxyalkanoates from hydroxyalkanoates in bacteria by converting 1,6-hexanediol, 1,5-pentaediol, 1,4-butanediol, 1,3-propanediol, 1,2-ethanediol or 1,2-propanediol to its corresponding hydroxyalkanote using an aldehyde dehydrogenase (aldH) from *E. coli* and a 1,3-propanediol oxidoreductase (dhaT) from *K. pneumoniae*, does not reasonably provide enablement for a method of producing polyhydroxyalkanoates from hydroxyalkanoates using any or all diol oxidoreductases, any or all aldehyde dehydrogenases in any organism by converting any diols to hydroxyalkanoates. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

Factors to be considered in determining whether undue experimentation is required are summarized in In re Wands 858 F.2d 731, 8 USPQ2nd 1400 (Fed. Cir. 1988). They include (1) the quantity of experimentation necessary, (2) the amount of

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direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims.

Claims 1 and 8-10 are drawn to a method for producing polyhydroxyalkanoates from 4-hydroxybutyrate, 2-hydroxybutyrate, 4-hydroxyvalerate, 5-hydroxyvalerate, 6-hydroxyhexanoate, 2-hydroxyethanoinate, 2-hydroxyisopionate and 3-hydroxyhexanoate in any organisms wherein the hydroxyalkanoates are produced by converting any diols to said hydroxyalkanoates with any diol oxidoreductase and any aldehyde dehydrogenase. While claim 2 through 7 limit the diols used in the method, said claims continue to encompass the use of any or all aldehyde dehydrogenases, diol oxidoreductases and organism.

Many different oxidoreductase from the family of diol dehydrogenase are known and many different dehydrogenase from the family of aldehyde dehydrogenases are known (see ExPASY database: aldehyde dehydrogenase and ExPASY database: diol oxidoreductase). The scope of the claims is not commensurate with the enablement provided by the disclosure with regard to the extremely large number of diol dehydrogenase, aldehyde dehydrogenase and diols broadly encompassed by the claims.

It would require undue experimentation of the skilled artisan to make and use the claimed method to convert any diols into 4-hydroxybutyrate, 2-hydroxybutyrate, 4-hydroxyvalerate, 5-hydroxyvalerate, 6-hydroxyhexanoate, 2-hydroxyethanoinate, 2-

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hydroxypriopionate and 3-hydroxyhexanoate using any diol oxidoreductase and any aldehyde dehydrogenase. It would also require undue experimentation of the skilled artisan to make and use the claimed method to convert 1,6-hexanediol, 1,5-pentaediol, 1,4-butanediol, 1,3-propanediol, 1,2-ethanediol or 1,2-propanediol into 4-hydroxybutyrate, 2-hydroxybutyrate, 4-hydroxyvalerate, 5-hydroxyvalerate, 6-hydroxyhexanoate, 2-hydroxyethanoate, 2-hydroxypriopionate or 3-hydroxyhexanoate using any diol oxidoreductase and aldehyde dehydrogenase. The specification is limited to teaching the use of an aldehyde dehydrogenase (aldH) from *E. coli* and a 1,3-propanediol oxidoreductase (dhaT) from *K. pneumoniae* to produce 4-hydroxybutyrate, 2-hydroxybutyrate, 4-hydroxyvalerate, 5-hydroxyvalerate, 6-hydroxyhexanoate, 2-hydroxyethanoate, 2-hydroxypriopionate and 3-hydroxyhexanoate from 1,6-hexanediol, 1,5-pentaediol, 1,4-butanediol, 1,3-propanediol, 1,2-ethanediol or 1,2-propanediol but provides no guidance with regard to the making of said hydroxyalkanoates with any diols and any diol oxidoreductase and any aldehyde dehydrogenase. The specification also does not provide guidance with regarding to the making of said hydroxyalkanoates with any diol oxidoreductase and any aldehyde dehydrogenase.

In view of the great breadth of the claim, amount of experimentation required to make the claimed hydroxyalkanote, the lack of guidance, working examples, and unpredictability of the art in predicting which diol oxidoreductase, aldehyde dehydrogenase, organism and/or diol to use, the claimed invention would require undue

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experimentation. As such, the specification fails to teach one of ordinary skill how to use the full scope of the method encompassed by the claims.

Thus, applicants have not provided sufficient guidance to enable one of ordinary skill in the art to make and use the claimed invention in a manner reasonably correlated with the scope of the claims broadly including method of making hydroxyalkanoates derived from any diols using any diol oxidoreductase and any aldehyde dehydrogenase and a method of making hydroxyalkanoates derived from 1,6-hexanediol, 1,5-pentaediol, 1,4-butanediol, 1,3-propanediol, 1,2-ethanediol or 1,2-propanediol using any diol oxidoreductase and any aldehyde dehydrogenase. The scope of the claims must bear a reasonable correlation with the scope of enablement (*In re Fisher*, 166 USPQ 19 24 (CCPA 1970)). Without sufficient guidance, determination of which diol oxidoreductase, aldehyde dehydrogenase, organism and/or diols to use is unpredictable and the experimentation left to those skilled in the art is unnecessarily, and improperly, extensive and undue. See *In re Wands* 858 F.2d 731, 8 USPQ2d 1400 (Fed. Cir, 1988).

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recite the phrase "genes". The metes and bounds of the phrase in the context of the above claim is not clear to the Examiner. A perusal of the specification did not provide the Examiner with a specific definition for the above phrase.


None of the claims are in condition for allowance.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yong Pak whose telephone number is 571-272-0935. The examiner can normally be reached 6:30 A.M. to 5:00 P.M. Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ponnathapu Achutamurthy can be reached on 571-272-0928. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9307 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-1600.

Yong D. Pak
Patent Examiner


Primary Examiner
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